

## 5. Shoreline Information

### 5.1. Shoreline Types and Sensitivity

The type of shoreline, degree of exposure to waves and currents, and biological sensitivity are the main criteria for selecting appropriate treatment techniques. Each shoreline type has particular properties (including vegetation types) which facilitate or resist the penetration and persistence of oil. Areas of comparatively uniform sediment type and grain size experience a deeper penetration of oil. Grain size definitions are:

Mud	<0.0625 mm
Fine Sand	0.0625 - 2 mm
Medium to Coarse Sand	2 - 4 mm
Pebble/Cobble	4 - 256 mm

Persistence of oil in a particular area is directly related to the intensity of wave action, tides, and currents. Based on numerous oil spill studies of shoreline characteristics, treatment, and oil impact, the matrices in Chapter 5 were formulated following the basic prototype of the Environmental Sensitivity Index Atlas.

The environmental sensitivity index (ESI) system ranks coastal environments on a scale of 1-10 or 11 (less sensitive to more sensitive) with respect to oil spill sensitivity and potential biological injury. ESI is being used for mapping extensive areas of the coastline of the U.S. Generally speaking, areas exposed to high levels of physical energy, such as wave action and tidal currents, rank low on the scale while sheltered areas have the highest ranking. The shoreline types used in this manual are a combination of the two similar systems used for the Delaware/Pennsylvania/New Jersey ESI Atlas, and the Maryland and Virginia atlases. The numbering system for the Countermeasure Manual Shoreline Types does not correspond exactly to either atlas; however, the corresponding shoreline types can be identified easily from the ESI maps and reassigned the appropriate number (after field verification.) The shoreline ranking system provides a useful first step in the design of contingency plans because it identifies the priority areas that require maximum effort for protection and cleanup. Strike teams and contractors with this document can focus their activities on environmental priorities, particularly during the first few hours and days of the spill.<sup>8</sup>

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<sup>8</sup>Regional Response Team III. Draft, *Shoreline Countermeasures Manual*. (Department of the Interior, March 22, 1991).


### 5.3 Shoreline Countermeasure Matrices

The matrices included here show which shoreline countermeasure techniques have been considered for the fourteen shoreline types described in Chapter 2 of the “Shoreline Countermeasures Manual & Matrices”, Northwest Area Plan, Chapter 9650, Page 9-37. Four matrices have been constructed for the major categories of oil (heavy, medium, light, very light).

Countermeasure methods are described in Chapters 3 and 4 of the manual. Countermeasures in Chapter 3 are traditional or conventional techniques that the OSC can use without any additional concurrence. However, the cutting of vegetation countermeasure should be used only during specific seasonal windows under specific conditions and with landowner approval. Countermeasures in Chapter 4 are described under a separate section called “Shoreline Countermeasure Methods Using Alternative Technology” may be useful in certain situations. These methods are considered more experimental and controversial in their application and potential impacts and require more formal review and consultation before implementing. The exact requirements are spelled out in the National Contingency Plan and the Northwest Area Plan. The Shoreline Countermeasures Matrices are a particularly dynamic component of the manual and should continue to be revised as the existing techniques are used and evaluated, and as both old and new techniques are refined.

Each matrix has a written explanation of how it is to be used as a countermeasure advisability matrix. The matrices are only a general guide for removing oil from shoreline substrates. They must be used in conjunction with the entire “Shoreline Countermeasures Manual” plus field observations and scientific advice. The countermeasures listed are not necessarily the best under all circumstances, and any listed technique may need to be used in conjunction with other techniques (including ones not listed herein). The Federal On-Scene Coordinator (FOSC) or the State OSC operating with the FOSC's authorization has the responsibility for and authority to determine which countermeasure(s) are appropriate for the various situations encountered.

Selection of countermeasure techniques to be used in each spill is based upon the degree of oil contamination, shoreline types, and the presence of sensitive resources. Extremely sensitive areas are generally limited to manual cleanup methods. It is important to note that the primary goal of countermeasure implementation is the removal of oil from the shoreline with no further injury or destruction to the environment. The three categories of guidance used in the matrices are defined as follows:

R	Recommended	May be the preferred method that best achieves the goal of minimizing destruction or injury to the environment
C	Conditional	Viable and possibly useful but may result in limited adverse effects to the environment
	Shaded	Not applicable or not generally recommended.

## SHORELINE COUNTERMEASURES MATRIX

### Heavy Oil (Heavy Crude Oils, Intermediate Fuel Oils, Bunker C & Heavily Weathered Medium Crudes)

- Heavy oils with little or no evaporation or dissolution
- Water-soluble fraction likely to be <10ppm
- Heavy contamination of intertidal areas likely
- Severe impacts to waterfowl and fur-bearing mammals (coating and ingestion)
- Long-term contamination to sediments possible
- Weathers very slowly
- Dispersion seldom effective
- Shoreline cleanup difficult under all conditions

### SHORELINE TYPES CODES

1- Exposed rock shores and vertical, hard man-made structure (e.g. seawalls)	6B - Gravel beaches - cobbles to boulders
2 - Exposed wave-cut platforms	6C - Exposed rip rap
3 - Fine to medium grained sand beaches & steep unvegetated river banks	7 - Exposed tidal flat
4 - Course grained sand beaches	8A- Sheltered vertical rock shores and vertical, hard man-made structures (e.g. seawalls, docks, bulkheads)
5 - Mixed sand and gravel beaches, including artificial fill containing a range of grain size and material	8B - Sheltered rubble slope
6A - Gravel beaches - pebbles to cobble	9A - Sheltered sand and mud flats
	9B - Sheltered vegetated low bank
	10 - Marshes

### SHORELINE TYPES

COUNTERMEASURES	1	2	3	4	5	6A	6B	6C	7	8A	8B	9A	9B	10
CONVENTIONAL METHODS														
No action	C	C	C	C	C	C	C	C	R	C	C	R	C	R
Manual removal of oil	C	R	R	R	R	C	C	C		R	R		C	C
Passive collection of oil	R	R	R	R	R	R	R	R	C	R	R	C	R	R
Oiled debris removal	C	R	R	R	R	R	R	R	C	R	R	C	R	C
Trenching/recovery wells			C	C	C									
Oiled sediment removal			C	C	C	C		C					C	
Ambient water flooding (Deluge)			C	C	C	R	R	R		R	R		C	C
Amb water flush <50 psi	C	C			C	R	C	R		C	C		C	C
Amb water flush <100 psi	C	C					C	C		C	C			
Warm water flush <90°F	C						C	C		C				
Hot water flush >90°F	C									C				
Vacuum removal of oil	C	C	C	C	C	C	C	C		C	C		C	C
Sediment reworking			C	C	C	C								
Sediment Removal-cleaning-replacement			C	C	C	C		C						
Cutting oiled vegetation							C	C		C	C		C	C
ALTERNATIVE METHODS*														
In-situ burning on shore														
Chemical stabilization, protection, cleaning														
Nutrient enhancement			C	C	C	C	C	C						C
Microbial addition														

**R** Recommend - May be Preferred Alternative

**C** Conditional (Refer to NW Shoreline Countermeasures Manual)

Shaded areas are Not Applicable or Not Generally Recommended

\* Follow approved process defined in NCP and NW Area Plan

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## SHORELINE COUNTERMEASURES MATRIX

### Medium Oil (Most Crude Oils & Some Heavily Weathered Light Crudes)

- About 1/3 will evaporate within 24 hours
- Maximum water-soluble fraction is 10-100ppm
- Oil contamination of intertidal areas can be severe and long-term
- Impact to waterfowl and fur-bearing mammals can be severe
- Chemical dispersion is an option within 1-2 days
- Cleanup most effective if conducted quickly

### SHORELINE TYPES CODES

1 - Exposed rock shores and vertical, hard man-made structure (e.g. seawalls)	6B - Gravel beaches - cobbles to boulders
2 - Exposed wave-cut platforms	6C - Exposed rip rap
3 - Fine to medium grained sand beaches & steep unvegetated river banks	7 - Exposed tidal flat
4 - Course grained sand beaches	8A - Sheltered vertical rock shores and vertical, hard man-made structures (e.g. seawalls, docks, bulkheads)
5 - Mixed sand and gravel beaches, including artificial fill containing a range of grain size and material	8B - Sheltered rubble slope
6A - Gravel beaches - pebbles to cobble	9A - Sheltered sand and mud flats
	9B - Sheltered vegetated low bank
	10 - Marshes

### SHORELINE TYPES

COUNTERMEASURES	1	2	3	4	5	6A	6B	6C	7	8A	8B	9A	9B	10
CONVENTIONAL METHODS														
No action	C	C	C	C	C	C	C	C	R	C	C	R	C	R
Manual removal of oil	C	R	R	R	R	C	C	C		R	R		C	C
Passive collection of oil	R	R	R	R	R	R	R	R	C	R	R	R	R	R
Oiled debris removal	C	R	R	R	R	R	R	R	C	R	R	C	R	C
Trenching/recovery wells			C	C	C									
Oiled sediment removal			C	C	C	C							C	
Ambient water flooding (Deluge)			C	C	C	R	R	R		R	R		C	C
Amb water flush <50 psi	C	C			C	R	C	R		R	R		C	C
Amb water flush <100 psi	C	C					C	C		C				
Warm water flush <90°F	C						C	C		C				
Hot water flush >90°F	C									C				
Vacuum removal of oil	C	C	R	R		C	R	R		C	C		C	C
Sediment reworking			C	C	C	C								
Sediment Removal-cleaning-replacement			C	C	C	C		C			C			
Cutting oiled vegetation							C	C		C	C		C	C
ALTERNATIVE METHODS*														
In-situ burning on shore														
Chemical stabilization, protection, cleaning														
Nutrient enhancement			C	C	C	C	C	C			C			C
Microbial addition														

**R** Recommend - May be Preferred Alternative

**C** Conditional (Refer to NW Shoreline Countermeasures Manual)

Shaded areas are Not Applicable or Not Generally Recommended

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## SHORELINE COUNTERMEASURES MATRIX

### Light Oil (Diesel, No 2 Fuel Oils, Light Crudes)

- Moderately volatile; will leave residue (up to 1/3 of spilled amount)
- Moderate concentrations of toxic (soluble) compounds
- Long-term contamination of intertidal resources possible
- Potential for subtidal impacts (dissolution, mixing, sorption onto suspended sediments)
- No dispersion necessary
- Cleanup can be very effective

### SHORELINE TYPES CODES


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	9B - Sheltered vegetated low bank
	10 - Marshes

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COUNTERMEASURES	1	2	3	4	5	6A	6B	6C	7	8A	8B	9A	9B	10
CONVENTIONAL METHODS														
No action	R	R	C	C	C	C	C	C	R	C	C	R	C	R
Manual removal of oil			C	C	C	C	C	C		R	R		C	
Passive collection of oil	C	R	R	R	R	R	R	R	C	R	R	C	R	R
Oiled debris removal	C	C	R	R	R	R	R	R	C	R	R	C	C	C
Trenching/recovery wells			C	C	C									
Oiled sediment removal			C	C	C	C								
Ambient water flooding (Deluge)			C	C	C	R	R	R			C			C
Amb water flush <50 psi		C			C	C	C	C		R	C			C
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Hot water flush >90°F														
Vacuum removal of oil							C	C						C
Sediment reworking			C	C	C	C								
Sediment Removal-cleaning-replacement			C	C	C									
Cutting oiled vegetation							C	C		C	C		C	C
ALTERNATIVE METHODS*														
In-situ burning of shore														
Chemical stabilization, protection, cleaning														
Nutrient enhancement			C	C	C	C	C	C						C
Microbial addition														

**R** Recommend - May be Preferred Alternative

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## SHORELINE COUNTERMEASURES MATRIX

### Very Light Oil (Jet fuels, Gasoline)

- Highly volatile (should all evaporate within 1-2 days)
- High concentration of toxic (soluble) compounds
- Result: Localized, severe impacts to water column and intertidal resources
- Duration of impact is a function of the resource recovery rate
- No dispersion necessary

### SHORELINE TYPES CODES

1- Exposed rock shores and vertical, hard man-made structure (e.g. seawalls)	6B - Gravel beaches - cobbles to boulders
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CONVENTIONAL METHODS														
No action	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Manual removal of oil														
Passive collection of oil			C	C	C	C	C	C						
Oiled debris removal	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Trenching/recovery wells			C	C	C									
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## Purpose of Chapter 6

The information presented in this chapter highlights some of the more significant environmentally sensitive areas within the GRP region that could be impacted as a result of an oil spill. Consistent with the overall purpose of the GRP's, this information is only intended to provide a level of detail required during the initial phase of spill response. During an actual event, additional resource information will be available from the resource trustee agencies supporting the Environmental Unit in the Planning Section. Specific resource concerns for areas that already have designated protection strategies in Chapter 4 of the GRP may be found in the "Resources Protected" column in the matrix describing the individual strategies.

The information provided in Chapter 6 is intended for use in:

- Preparing an initial ICS 232 form (Resources-at-Risk summary) for Incident Command
- Identifying those sites where it may be necessary to implement Flight Restriction Zones in order to prevent disturbance/injury to sensitive wildlife species.
- Identifying sensitive shoreline habitats to assist SCAT teams in their initial assessments and to help personnel in the Environmental Unit in developing appropriate cleanup strategies.

Chapter 6 consists of two sets of maps and tables - one for wildlife and the other for fish, shellfish and selected sensitive marine habitats. These data are presented separately, both for ease of reading and because each of the two data sets has slightly different applications within the context of spill response.

The wildlife maps and tables present information on the location and seasonal sensitivity of key wildlife resources. Types of data included here are concentration areas for waterfowl, marine birds and shorebirds; seabird colonies; nesting areas for sensitive species such as eagles, herons and falcons; and marine mammal haulout sites. This information is intended for the rapid identification of areas where significant wildlife oiling impacts could be anticipated and to denote areas where flight restriction zones may be required to protect sensitive wildlife. Each site depicted on these maps is identified by a unique number in order to facilitate the process of communicating Flight Restriction Zone recommendations to the Operations Section in ICS. The tables accompanying the wildlife maps present information on the season(s) during which sites may be particularly sensitive to disturbance.

The fish/shellfish/marine habitat maps present general information on the location of baitfish spawning beaches, herring spawning areas, streams used by anadromous salmonids, hardshell clam concentrations, and kelp and eelgrass beds. This information will be most useful to personnel involved in assessing initial risks to fish and shellfish resources and to those conducting initial beach reconnaissance, pending availability of more detailed resource information and the formation of SCAT teams.

Because the operational uses of this information differ from those of the wildlife data, individual site identification numbers have not been assigned. Tables associated with these maps will identify the seasonal sensitivity of each resource. In addition, notes accompanying each table will provide information on the general distribution and seasonal sensitivity of those resources that are not mapped but may occur anywhere in the GRP region (ex. juvenile salmonids in shallow nearshore waters).

## **6.0 Sensitive Resource Description**

### **6.1 Fisheries**

A series of maps representing the current knowledge of some of Washington Department of Fisheries' trust resources appear in Appendix A. The maps focus on nearshore resources of high commercial, recreational, or ecological value.

Willapa Bay contains a wide variety of fisheries resources. These include Pacific salmon; baitfish resources such as Pacific Herring, and surf smelt; shellfish resources such as native oysters; Pacific oysters; crabs; cockle clams; Eastern clams; Manila; Horse clams; and other species of aquatic life.<sup>11</sup>

Adult and juvenile life stages of a number of ecologically and economically important species including salmon, marine fish, baitfish, and shellfish as well as the plankton community are considered to be ubiquitous in distribution and therefore, are not displayed on maps.

Additional information provided in Appendix A includes habitat association and timing tables. These tables display information on temporal and spatial distribution, preferred habitat, and relative abundance of various life history stages.<sup>12</sup>

### **6.2 Wildlife**

#### **Marine Mammals**

Both Grays Harbor and Willapa Bay play a significant role in the life history of our state's harbor seal population. Both estuaries are used year-round as resting and feeding areas. Two features make these estuaries unique: the presence of numerous haulout sites scattered among the islands and tidal flats, and an abundant year-round food supply. Seals are most abundant here during spring and summer months; roughly April through September. During this period of peak abundance, these estuaries account for almost 40% of Washington's statewide population. Analysis of 1992 aerial survey data yielded a peak population estimate of over 11,000 seals (including over 2400 pups) for the two estuaries combined.

Pupping occurs from April through July with the peak occurring in late May and early June. Maximum numbers of haulout sites are occupied during this season as females move to peripheral areas throughout the estuaries to give birth and nurse their young. Closely associated mother/pup pairs may still be present through early August. During the period from July to September seal numbers in the estuaries remain high as adults go through their annual molt and recently weaned pups learn to feed on their own. Seal numbers begin to decrease in September as many animals begin to leave the estuaries and migrate to the Columbia River where they will overwinter.

The only other marine mammal which commonly uses these estuaries is the gray whale. This species is most frequently found just outside the mouths of the estuaries during the northward spring migration which lasts from March through May. During this period, it is common for some individuals to enter the mouths of both estuaries to feed.<sup>13</sup>



## **Shorebirds, Waterfowl, and Raptors**

Grays Harbor and Willapa Bay play a critical role for migrating and wintering shorebirds, waterfowl and raptors. Over a million shorebirds stop in the bays to rest and feed each spring before continuing their migration from wintering grounds as far south as South America to breeding grounds in the Arctic. Bird numbers peak during the second half of April as western sandpipers and numerous other species pass through on their way north. Shorebirds are virtually absent from the estuaries in June, but quickly increase as they begin their southward migration from the breeding grounds. While most shorebirds pass through to points farther south, thousands of dunlin and black-bellied plovers spend the winter in the estuaries.

More than twenty-five species of waterfowl occur in these estuaries including brant, pintail and American wigeon. Eelgrass beds play a crucial role in supporting hundreds of thousands of ducks and geese from mid-September through mid-May.

Grays Harbor and Willapa Bay are used by many other species for nesting and feeding including bald eagles, double-crested cormorants, great blue herons, Caspian terns and western gulls. Other species that breed elsewhere but spend a portion of their life in the estuaries include brown pelicans, common terns, marbled murrelets, common murre, rhinoceros auklets and several species of loons, grebes and gulls.<sup>14</sup>

### **6.3 Archeological Sites**

#### Geographic Site Locations

- (1) East side of Long Beach Peninsula from Oysterville to point west of Jensen Point, Long Island
- (2) Nemah River mouth
- (3) Seal Slough
- (4) Sunshine Point
- (5) Stanley Peninsula
- (6) Beachside, Sandy Point to Bay Center
- (7) East side of Palix River mouth
- (8) Both sides of Bone River mouth

#### General Resources:

Potential archaeological; village sites; shell middens; camp sites; food gathering sites. Remains of fish weirs in intertidal zone and in deeper water.

#### Seasonal Sensitivity:

Sensitive at all times of the year.

#### Recommendations:

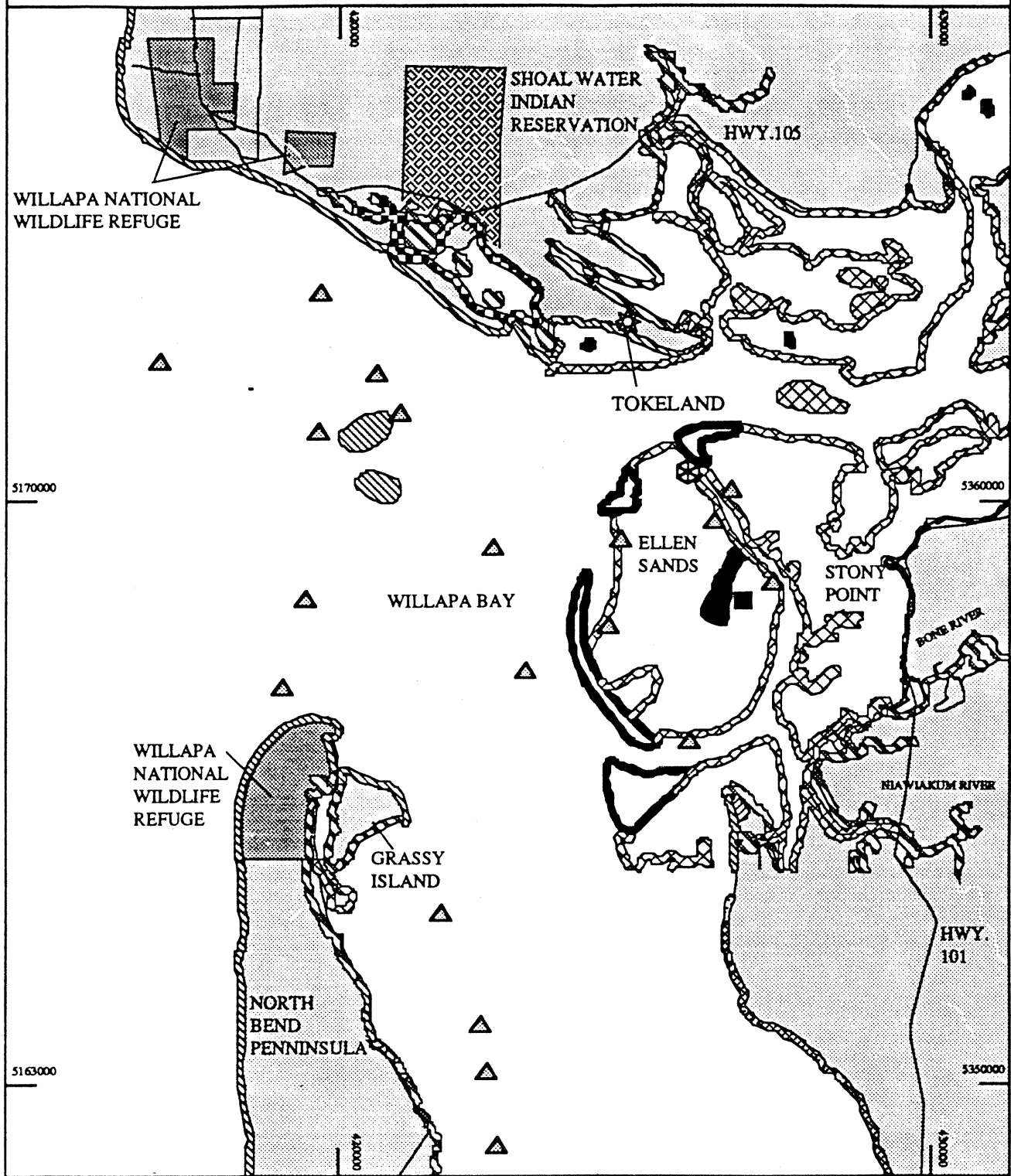
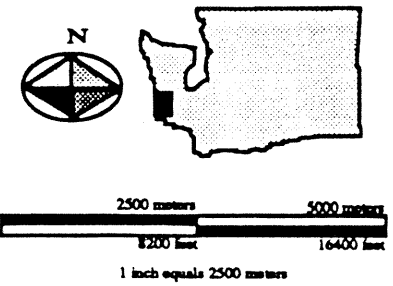
Areas identified on overlay (see map display) are generalized sensitive areas; it is theorized that archeological sites are likely to be located at mouths of freshwater streams or adjacent upland areas. Cleanup crews should stay on established access routes (roads, trails, etc.) and avoid disturbance to adjacent areas. Fish weirs in Grays Harbor are very sensitive and booming or skimming operations should avoid if possible or use extreme care in these areas. Recommend Office of Archeology and Historic Preservation staff or cultural resource person on board if necessary.<sup>15</sup>

# WILLAPA BAY

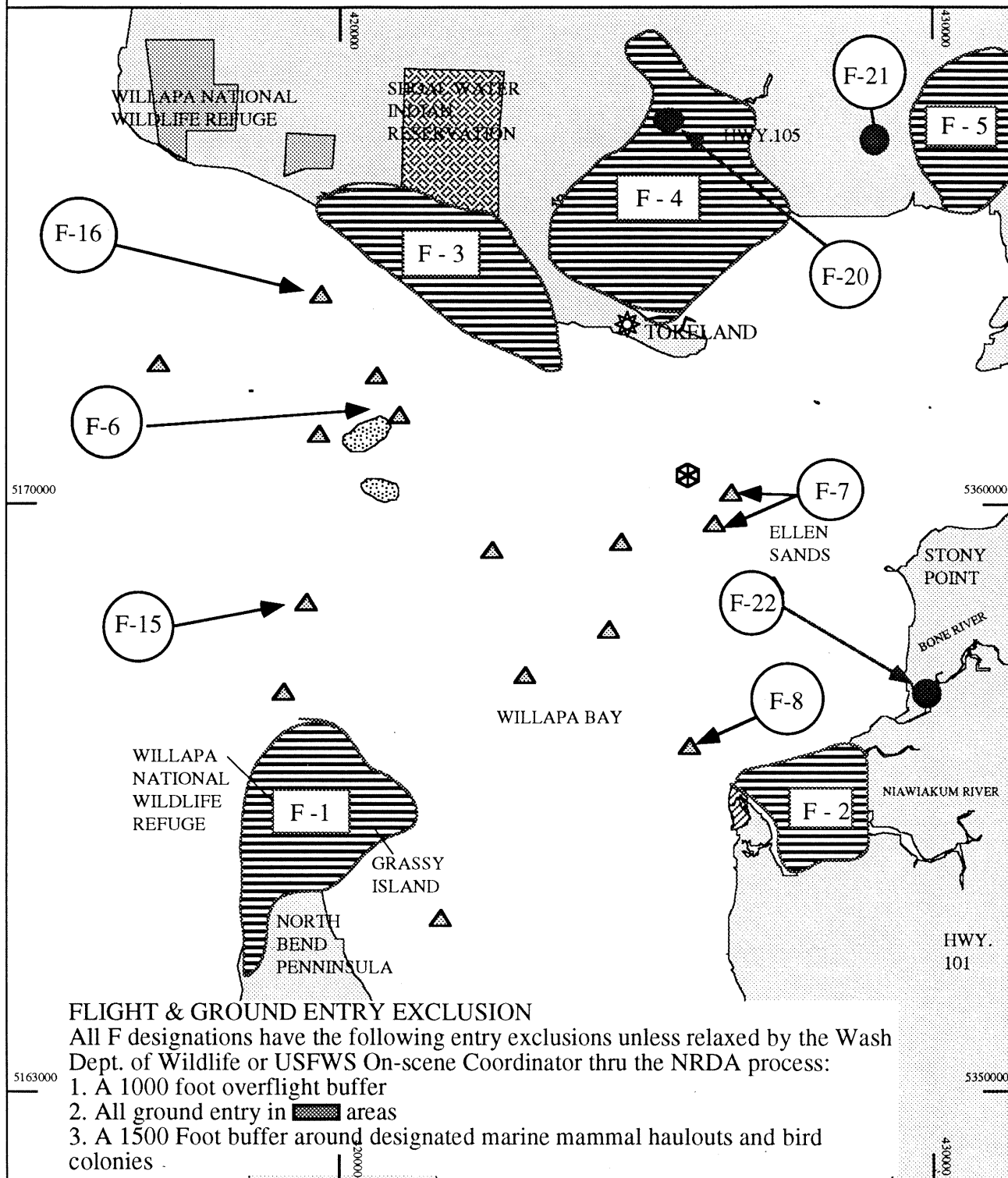
- ▲ MARINE MAMMAL HAULOUT
- MARINE MAMMAL SIGHTING
- BIRD COLONY
- ⊠ BOAT LAUNCH

- ▨ EXPOSED ROCKY SHORE (OR SEAWALL)
- ▩ WAVE-CUT PLATFORM
- ▧ FINE GRAINED BEACH
- ▦ COARSE GRAINED BEACH
- ▤ SAND/GRAVEL BEACH

- ⌘ KELP
- ▨ PARK OR PUBLIC LAND
- ▩ RESERVATION
- ⊠ TOWN OR CITY
- ▤ GRAVEL/COBBLE/RUPRAP BEACH
- ▩ EXPOSED TIDAL FLAT
- ▧ SHELTERED ROCKY FLAT
- ▦ SHELTERED TIDAL FLAT
- ▤ MARSH



# WILLAPA BAY



# OYSTERVILLE

- ▲ MARINE MAMMAL HAULOUT
- MARINE MAMMAL SIGHTING
- BIRD COLONY
- ⊕ BOAT LAUNCH

- ☞ KELP
- ▨ PARK OR PUBLIC LAND
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▩ EXPOSED ROCKY SHORE (OR SEAWALL)

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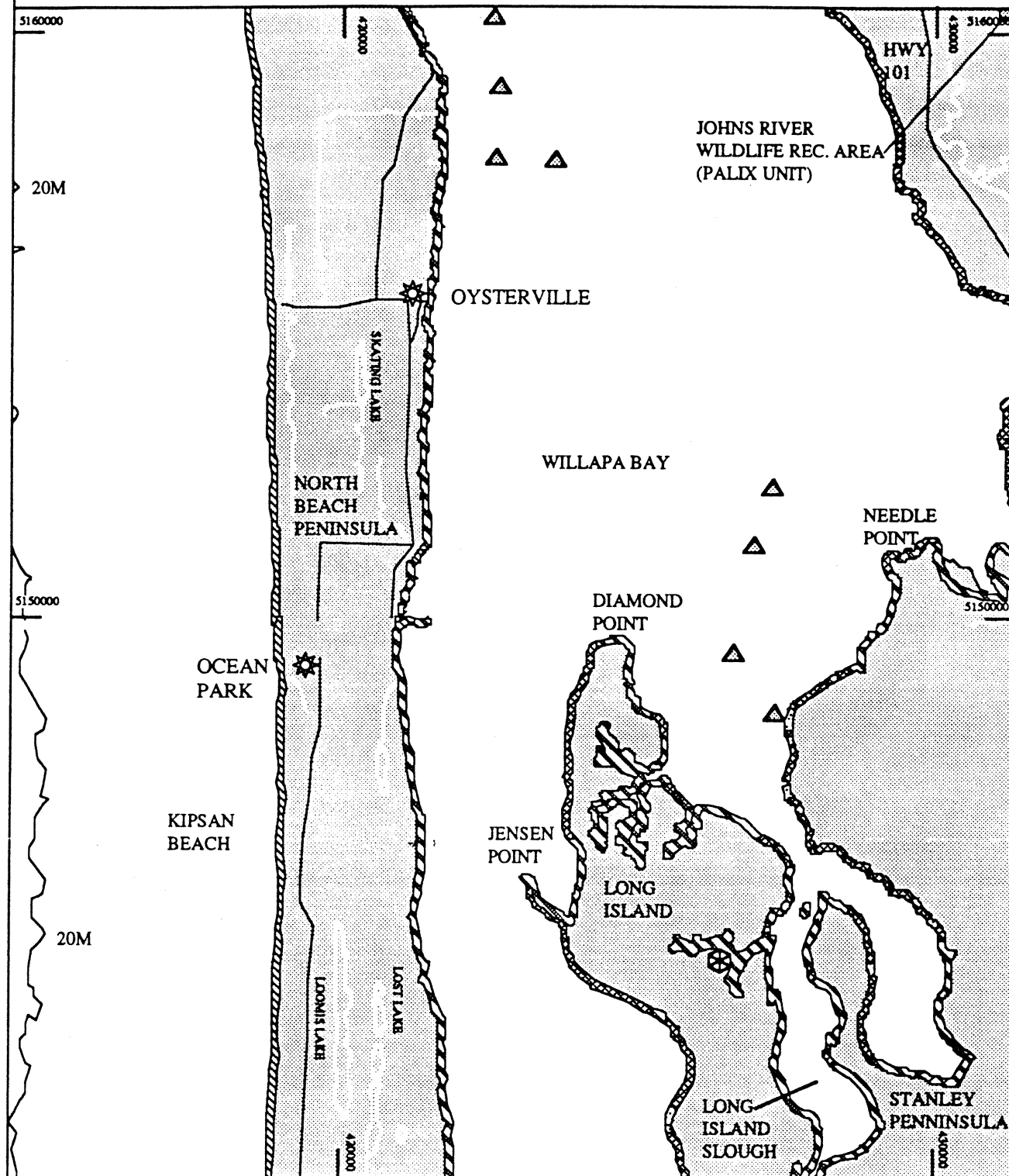
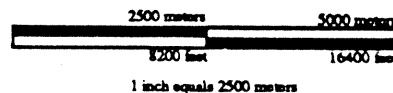
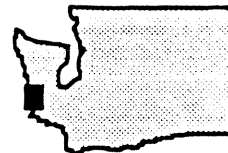
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▨ EXPOSED TIDAL FLAT

▨ SHELTERED ROCKY FLAT

▨ SHELTERED TIDAL FLAT

▨ MARSH

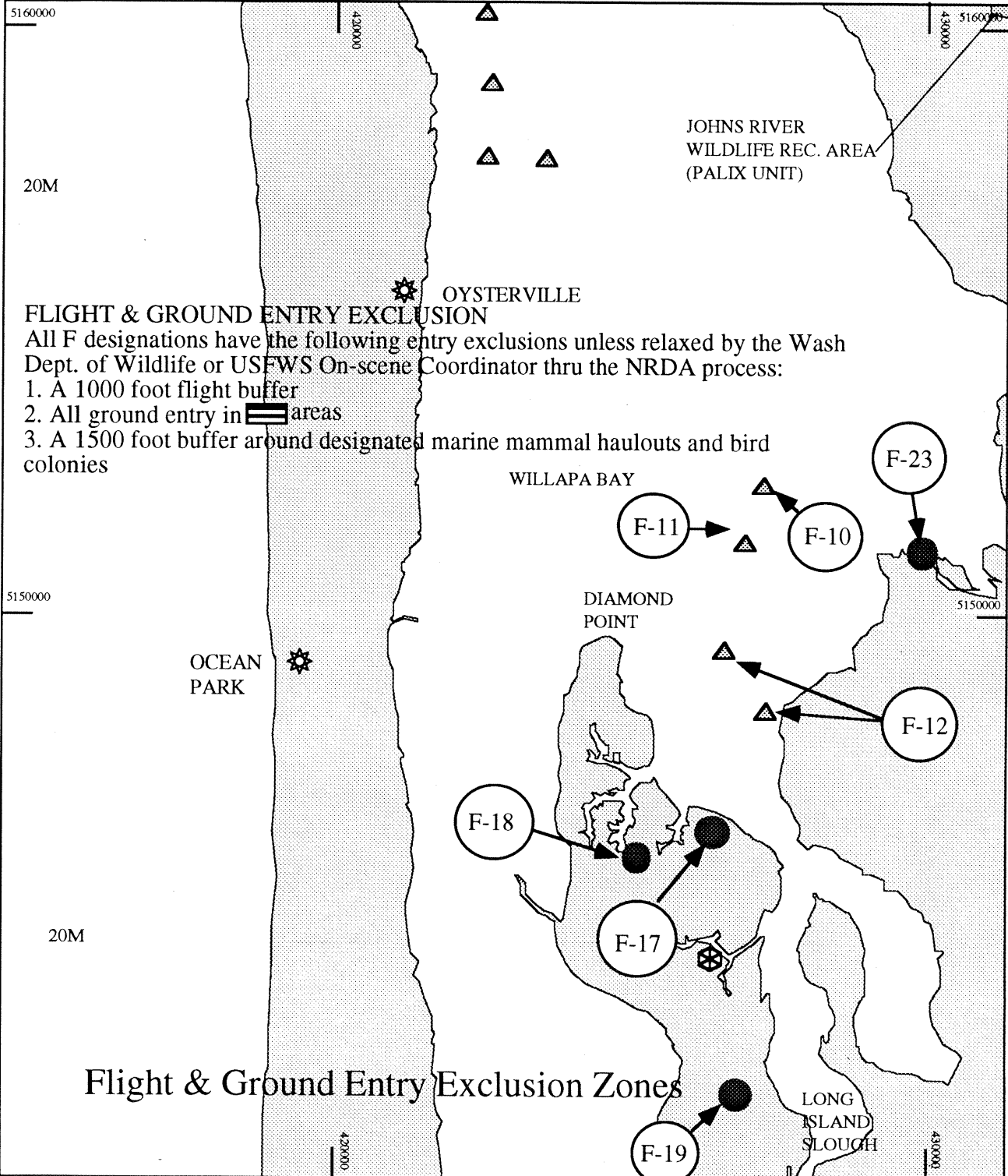
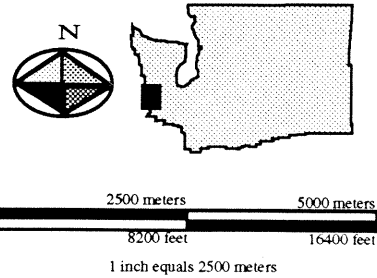


# OYSTERVILLE

- MARINE MAMMAL HAULOUT
- MARINE MAMMAL SIGHTING
- BIRD COLONY
- BOAT LAUNCH

- EXPOSED ROCKY SHORE (OR SEAWALL)
- WAVE-CUT PLATFORM
- FINE GRAINED BEACH
- COARSE GRAINED BEACH
- SAND/GRAVEL BEACH

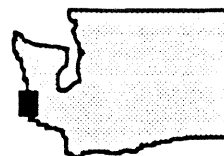
- KELP
- PARK OR PUBLIC LAND
- RESERVATION
- TOWN OR CITY
- GRAVEL/COBBLE/RIPRAP BEACH
- EXPOSED TIDAL FLAT
- SHELTERED ROCKY FLAT
- SHELTERED TIDAL FLAT
- MARSH



# WILLAPA RIVER

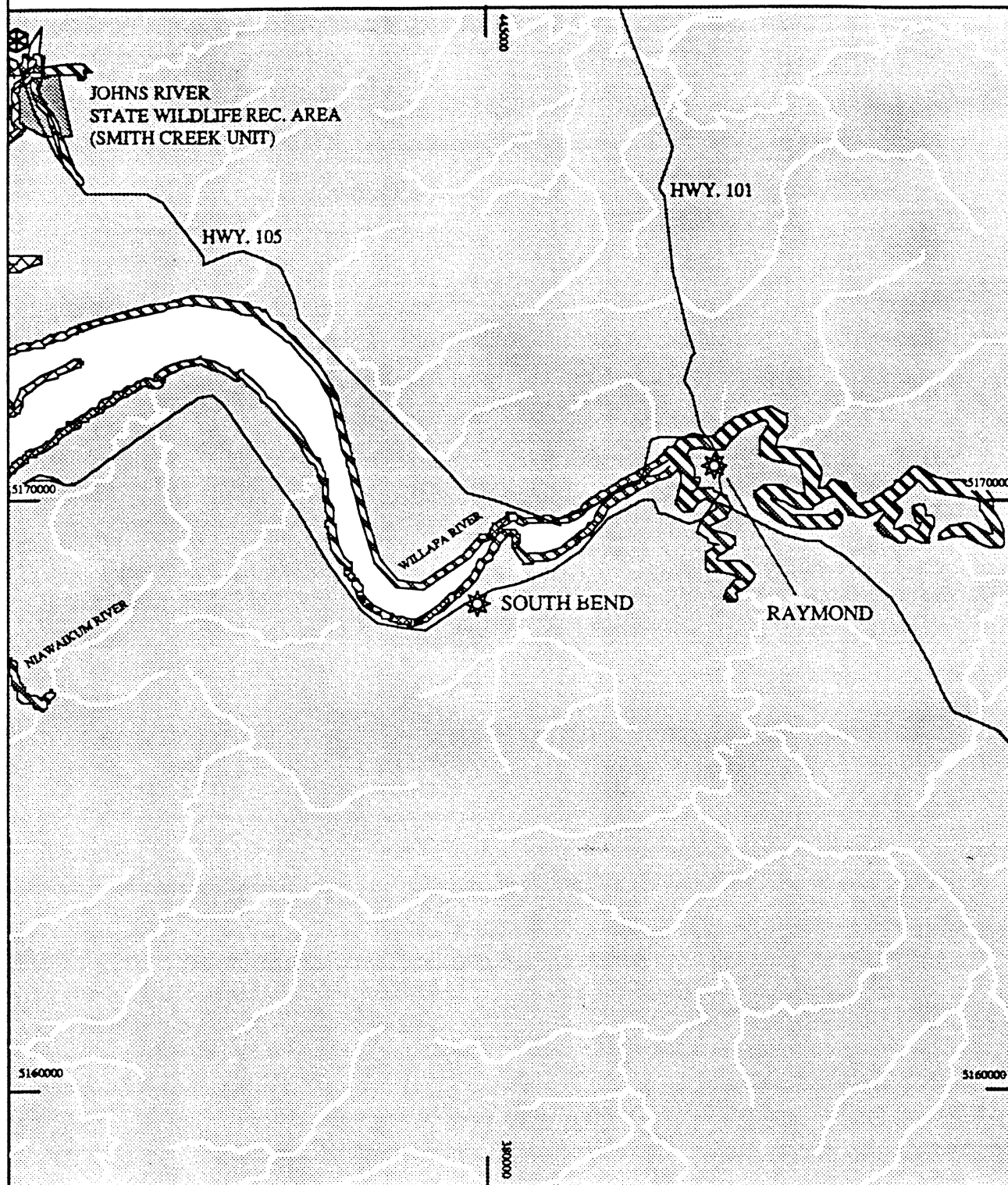
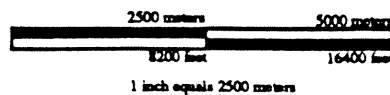
- ▲ MARINE MAMMAL HAULOUT
- MARINE MAMMAL SIGHTING
- BIRD COLONY
- ⊞ BOAT LAUNCH

- ⬛ KELP
- ▨ PARK OR PUBLIC LAND
- ▩ RESERVATION
- ⚙ TOWN OR CITY












- ▨ EXPOSED ROCKY SHORE (OR SEAWALL)
- ▩ WAVE-CUT PLATFORM
- ▨ PINE GRAINED BEACH
- ▨ COARSE GRAINED BEACH
- ▨ SAND/GRAVEL BEACH

- ▨ GRAVEL/COBBLE/RIPRAP BEACH
- ▨ EXPOSED TIDAL FLAT
- ▨ SHELTERED ROCKY FLAT
- ▨ SHELTERED TIDAL FLAT
- ▨ MARSH

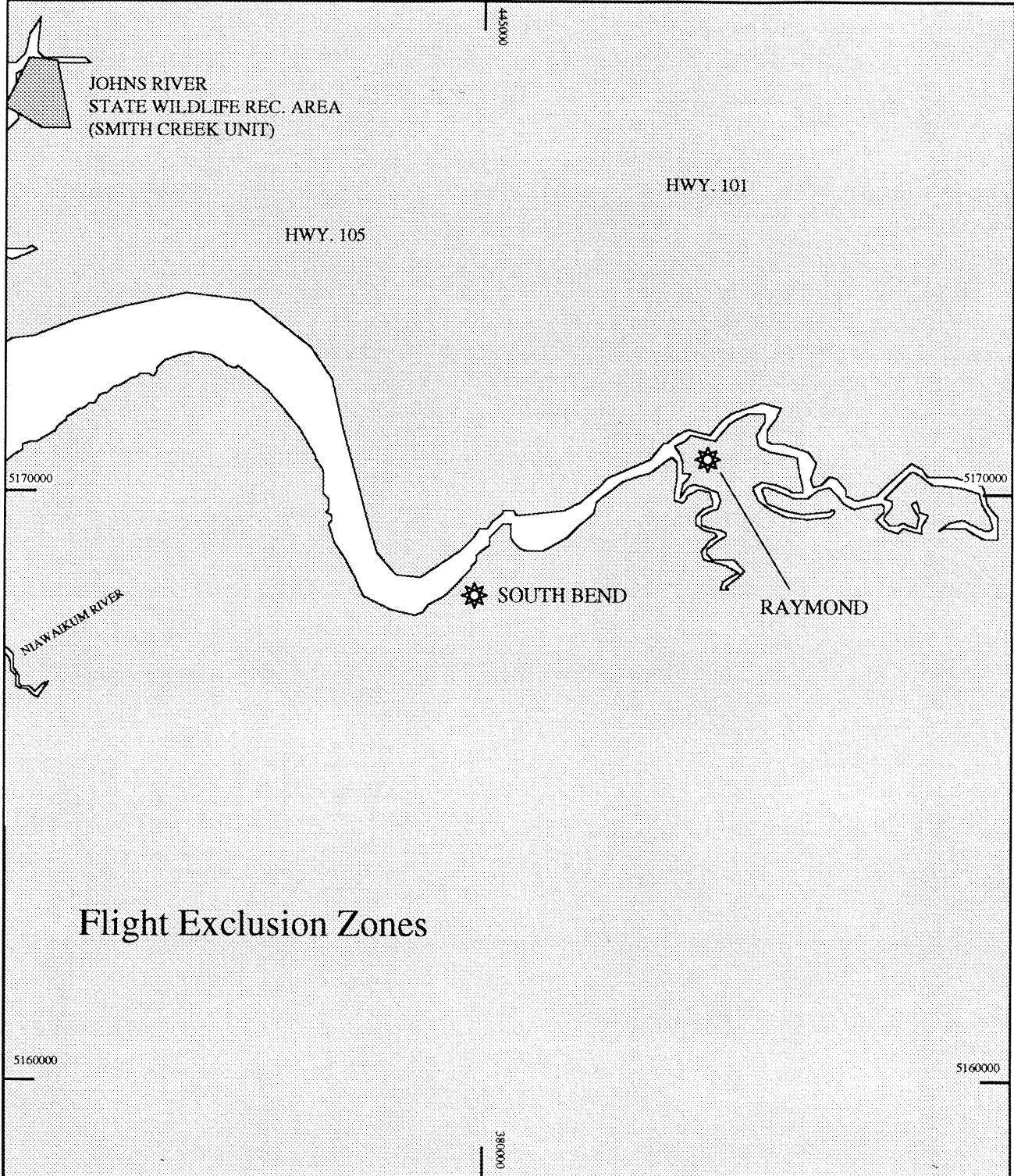
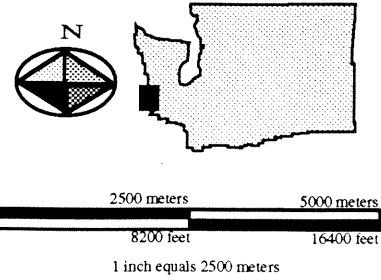


# WILLAPA RIVER

-  MARINE MAMMAL HAULOUT
-  MARINE MAMMAL SIGHTING
-  BIRD COLONY
-  BOAT LAUNCH

-  EXPOSED ROCKY SHORE (OR SEAWALL)
-  WAVE-CUT PLATFORM
-  FINE GRAINED BEACH
-  COARSE GRAINED BEACH
-  SAND/GRAVEL BEACH

-  KELP
-  PARK OR PUBLIC LAND
-  RESERVATION
-  TOWN OR CITY
-  GRAVEL/COBBLE/RIPRAP BEACH
-  EXPOSED TIDAL FLAT
-  SHELTERED ROCKY FLAT
-  SHELTERED TIDAL FLAT
-  MARSH





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**Table 4-2 Flight Exclusion Zones for Willapa Bay**

<b>Zone #</b>	<b>Location</b>	<b>Resource</b>	<b>Season</b>	<b>Comments</b>
F-1	Willapa Bay Refuge	Shorebird and waterfowl concentrations	winter/ spring/ fall	nesting and feeding
		Snowy Plover	spring/ summer/ fall	nesting - threatened
		Sensitive Nesting Area	all year	feeding
F-2	Mouth of the Palix River	Shorebird and waterfowl concentrations	winter/ spring/ fall	resting, feeding
F-3	North Cove	Shorebird and waterfowl concentrations	winter/ spring/ fall	resting, feeding
F-4	Inside Toke Point, Kindred and Teal Duck Sloughs	Shorebird and waterfowl concentrations	winter/ spring/ fall	resting and feeding
F-5	North River Mouth, area Northeast of Hawks Pt.	Shorebird and waterfowl concentrations	winter/ spring/ fall	resting, feeding
F-6	Island in the Mouth of Willapa Bay	Haul out - harbor seal only	May - August	exclusion when present
F-7	Pine Island Channel	Haul out - harbor seal only	May - August	exclusion when present
F-8	Deadheads, Bay Center Channel	Haul out - harbor seal only	May - August	exclusion when present
F-9	Southwest of Hawks Pt.	Haul out - harbor seal only	May - August	exclusion when present
F-10	Northeast of Diamond Point	Haul out - harbor seal only	May - August	exclusion when present
F-11	Southeast of Diamond Point	Haul out - harbor seal only	May - August	exclusion when present
F-12	Approx. 2,000 yards east of Diamond Point	Haul out - harbor seal only	May - August	exclusion when present
F-13	West side of Shoalwater Bay	Haul out - harbor seal only	May - August	exclusion when present
F-14	Middle of Shoalwater Bay, end of Nahcotta Channel	Haul out - harbor seal only	May - August	exclusion when present



**Table 4-2 Flight Exclusion Zones for Willapa Bay, continued**

<b>Zone #</b>	<b>Location</b>	<b>Resource</b>	<b>Season</b>	<b>Comments</b>
F-15	Leadbetter Channel	Haul out - harbor seal only	May - August	exclusion when present
F-16	Southwest of North Cove	Haul out - harbor seal only	May - August	exclusion when present
F-17	Northwest of Paradise Point, Long Island	Sensitive Nesting Area	Winter conc., Feb - July nesting	nesting
F-18	South of Kaffee Slough, Long Island	Sensitive Nesting Area	February - August	nesting
F-19	Southeast end of Long Island	Sensitive Nesting Area	February - August	nesting
F-20	South of Norris Slough	Sensitive Nesting Area	February - August	nesting
F-21	Northwest of Hawks Point	Sensitive Nesting Area	February - August	nesting
F-22	Bone River Mouth	Sensitive Nesting Area	February - August	nesting
F-23	Lynn Point	Sensitive Nesting Area	February - August	nesting

ALL ZONES IDENTIFIED ARE SUBJECT TO 1200' FLIGHT EXCLUSION AND 1000'-1500' ACCESS EXCLUSION.

Spring: March/April/May

Fall: August/September/October/November

Summer: June/July

Winter: December/January/February

IF IT IS NECESSARY TO ENTER A WILDLIFE ZONE, CONTACT THE WASHINGTON DEPARTMENT OF WILDLIFE.